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Stormwater 201 – Development Standards

Presented to the Joint City-County Planning Committee

Dave Brown, PE
Sandra Wilbur, PE

September 11, 2008

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Development Standards

- Peak Flow Control Standards
- *Water Quality Requirements*
- Stream Buffer Standards
- *BMP Agreements and Covenants*
- BMP As-built Standards
- *BMP Inspections/Maintenance*
- Proposed Stormwater Development Standards

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Peak Flow Requirements
1-, 2-, 10-, and 100-year Events

Stormwater Impact Analysis (SIA)

Every site plan submitted for review in the City of Durham includes a Stormwater Impact Analysis (or “SIA”) that includes an evaluation of the anticipated effects peak runoff rates from a proposed development may have on downstream property during the 1- (Neuse Basin only) , 2-, 10-, and 100-year rainfall events.

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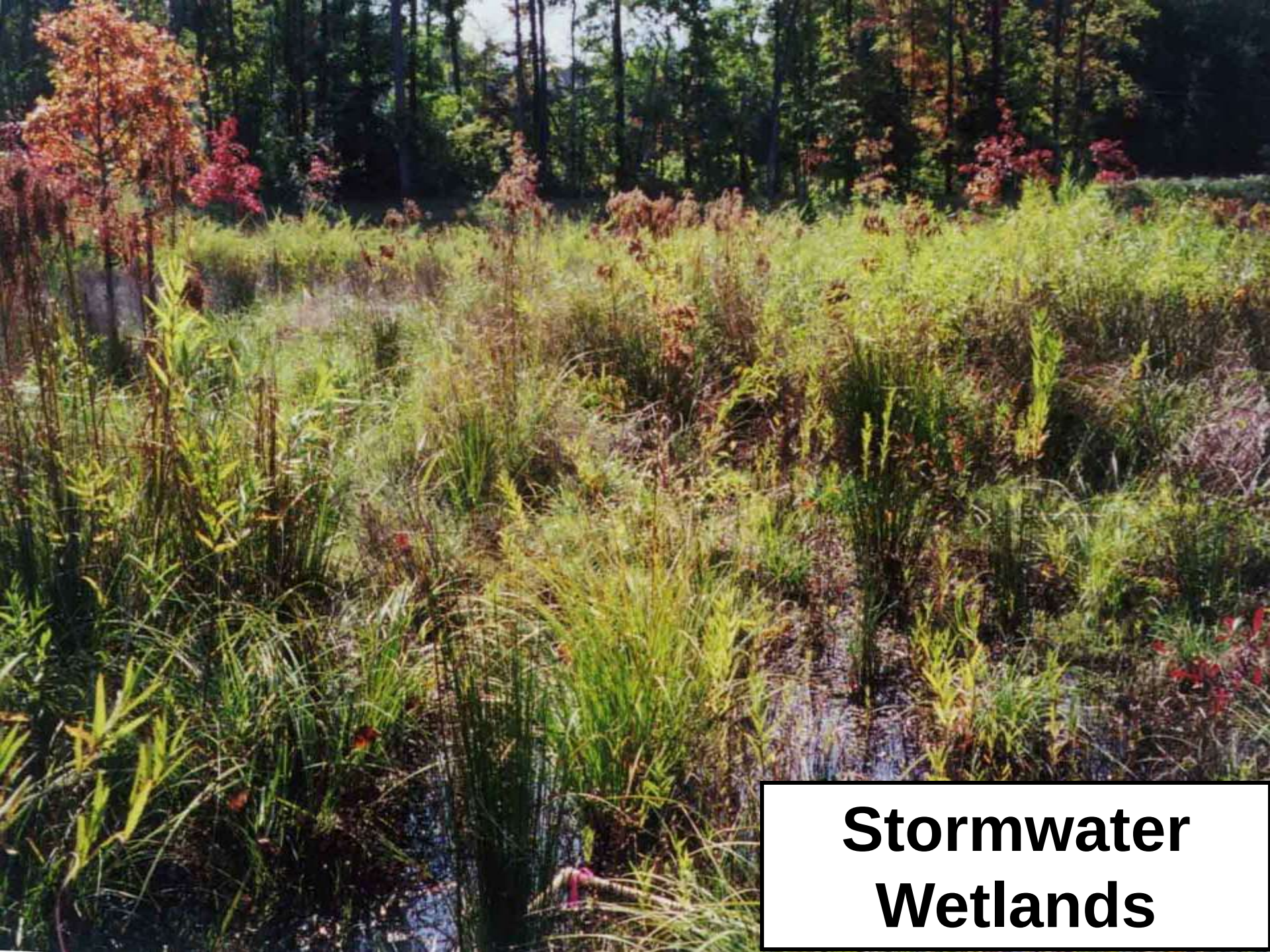
Peak Flow Requirements
1-, 2-, 10-, and 100-year Events

Downstream Impact?

If a proposed development is deemed to pose a negative impact on downstream property during the 1-, 2- or 10-year events, stormwater BMPs that “detain” post-developed peak runoff rates to pre-developed rates will be required. These “detention” BMPs typically include…

Dry Ponds

Wet Ponds



Stormwater Wetlands

Underground Detention Systems

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Peak Flow Requirements
1-, 2-, 10-, and 100-year Events

Special Concern: 100-Year Event

The SIA for proposed developments in previously developed areas (for example, “in-fill” developments) also includes an evaluation of the peak runoff rates during the 100-year rainfall event. If the development is deemed to pose a negative impact on downstream properties during the 100-year rainfall event, detention of the 100-year event will be required.

<u>No new floodplain allowed!!</u>

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Peak Flow Requirements
1-, 2-, 10-, and 100-year Events

The City's current inventory of stormwater BMPs now totals over 500, with more than 400 that include a detention function.

Current Inventory of Stormwater BMPs

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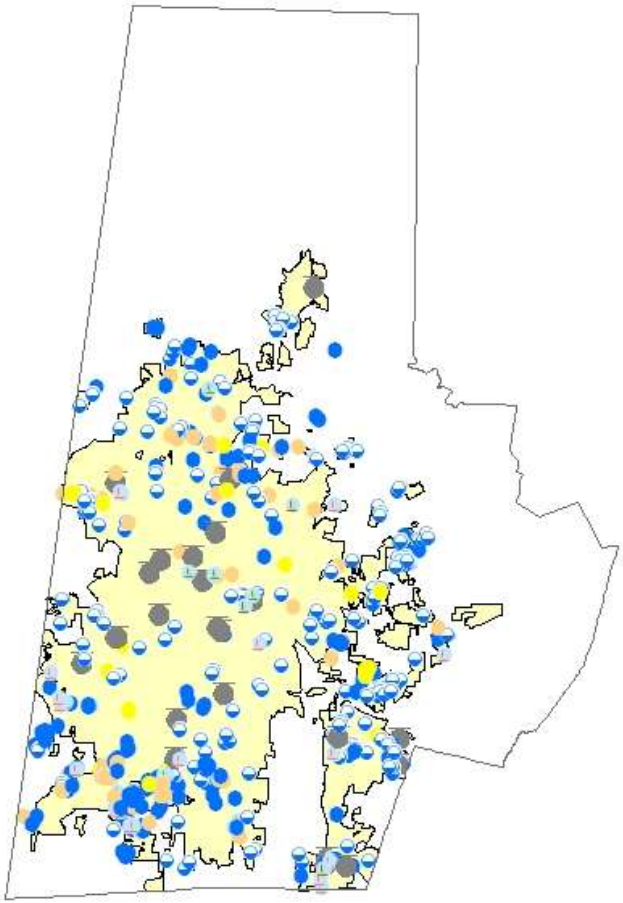

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Peak Flow Requirements
1-, 2-, 10-, and 100-year Events

In FY2008, Stormwater Services "permitted" 86 new stormwater BMPs, many of which include a detention function.

Note: City BMP design standards require all above ground detention facilities to include landscaping and water quality components to improve the aesthetics and water quality aspects of each facility.

Current Water Quality Requirements

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- Water Supply Watershed Protection (85% Total Suspended Solids (TSS) removal)
  - Falls Lake, Jordan Lake, Eno River, Lake Michie, Little River Reservoir
- Neuse Basin Requirements (Limit nitrogen to 3.6 lbs/acre/yr)
  - 1 year storm control and nitrogen controls
- Stream Buffer Requirements (Neuse, Water Supply, & UDO)

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Water Supply Watershed Overlay Requirements

- 85% Total Suspended Solid Removal Required (usually provided by a stormwater BMP)
- Increased Stream Buffer Width Requirements

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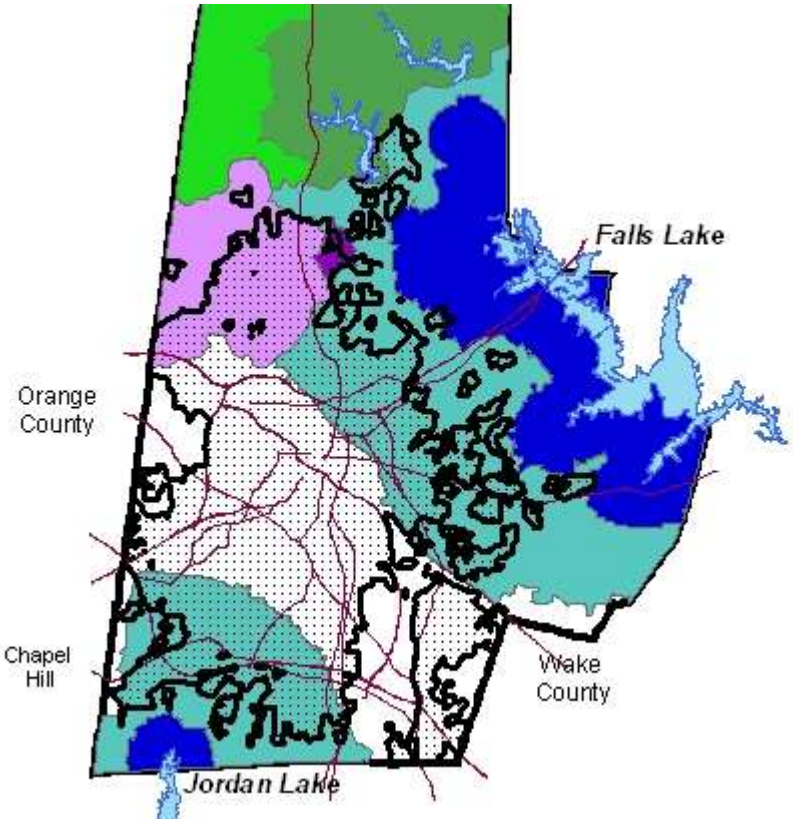
Water Supply Overlays 1994



Water Supply Overlays

Adopted Jan 1994

Dark Green - M/LR-A 6%

Green - M/LR-B 6%

Purple – E-B 24%

Blue – F/J-A 6-9%

Light Green – F/J-B 24%

M – Lake Michie

LR - Little River Reservoir

E – Eno River

F – Falls Lake

J – Jordan Lake

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Neuse River Basin Requirements

- Nitrogen Export Limits for development sites (3.6 lbs/acre/yr)
- No increase in 1-year storm
- Stream Buffer Requirements – 50’ from top of bank on both sides

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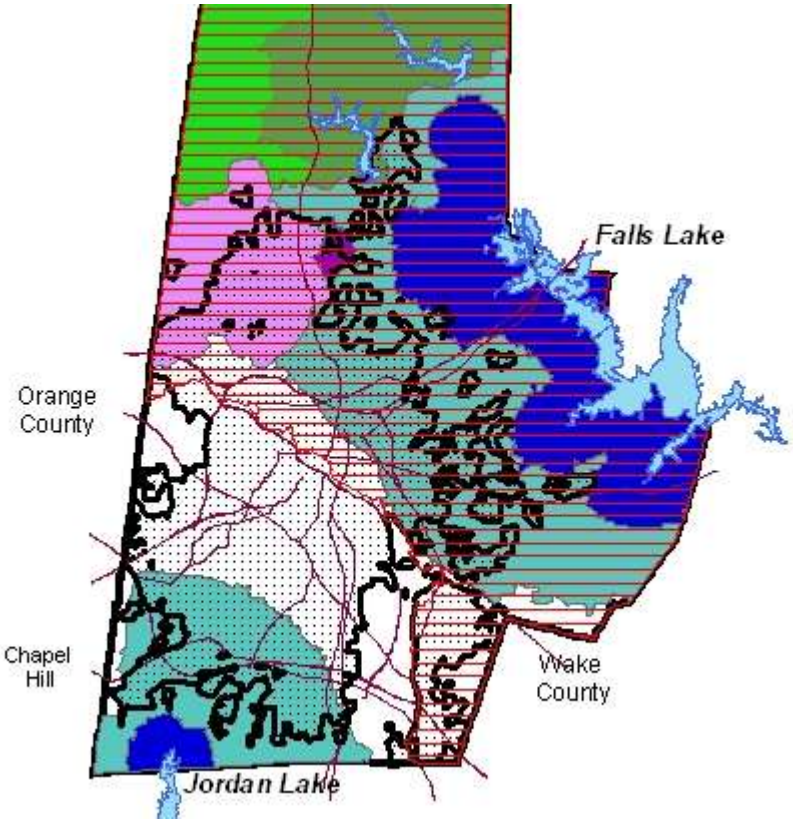
Neuse Requirements added 2001



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<u>Neuse Requirements March 2001</u> – Hatching

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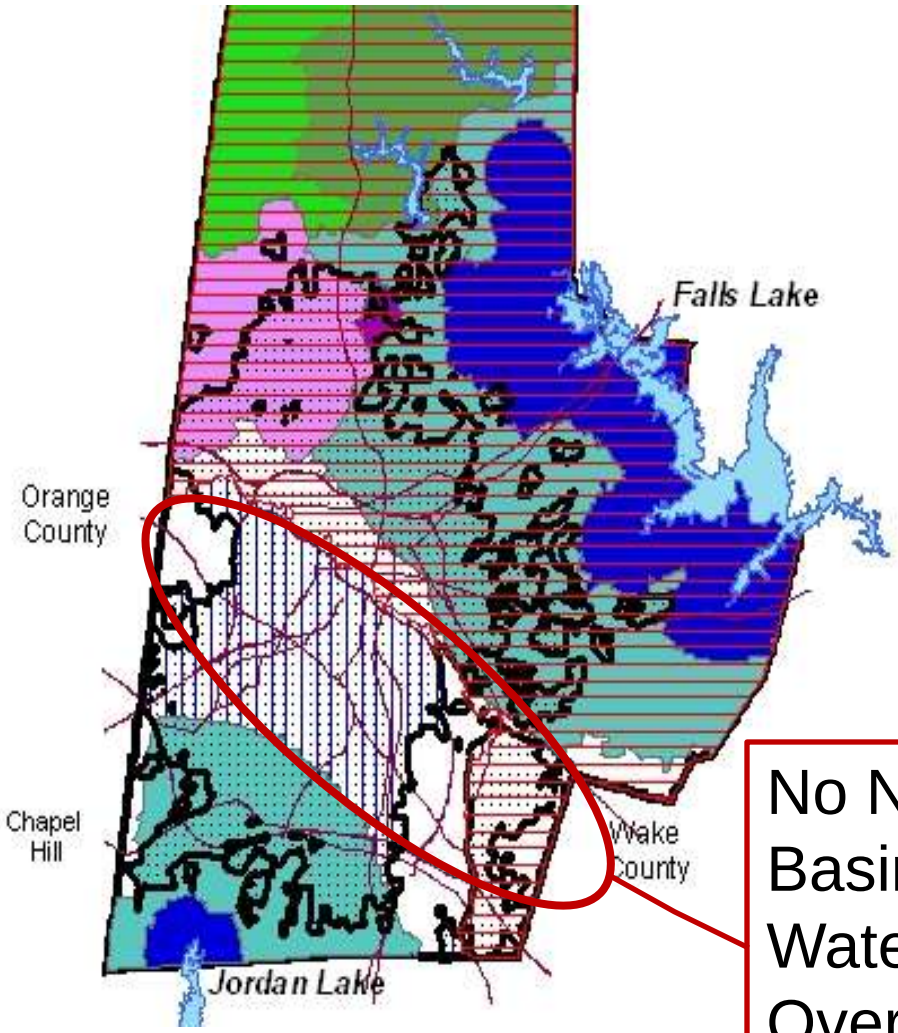

No Neuse Basin Rules or Water Supply Overlay Regulations

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Upcoming Rules

New 2007 NPDES Permit Requirements

Total Maximum Daily Loads (TMDLs) for Impaired Streams

Jordan Lake Rules

Falls Lake Rules

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2007 NPDES Permit

- Issued by NCDWQ
- We are Phase I City – This is our second permit
- First Permit was Issued in 1994
- The current NPDES Permit was Effective July 2007
- In addition - Phase II Permit requirements

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2007 NPDES Permit Requirements for Development

Treatment Highlights for <u>MINIMUM</u> Measures for new development:

- Control and treat first 1” of rain – must release between 48 and 120 hours
- Must discharge the storage volume for the one-year (24 hour storm) equal to or less than predevelopment
- Must provide 85% TSS removal
- Buffer Requirements

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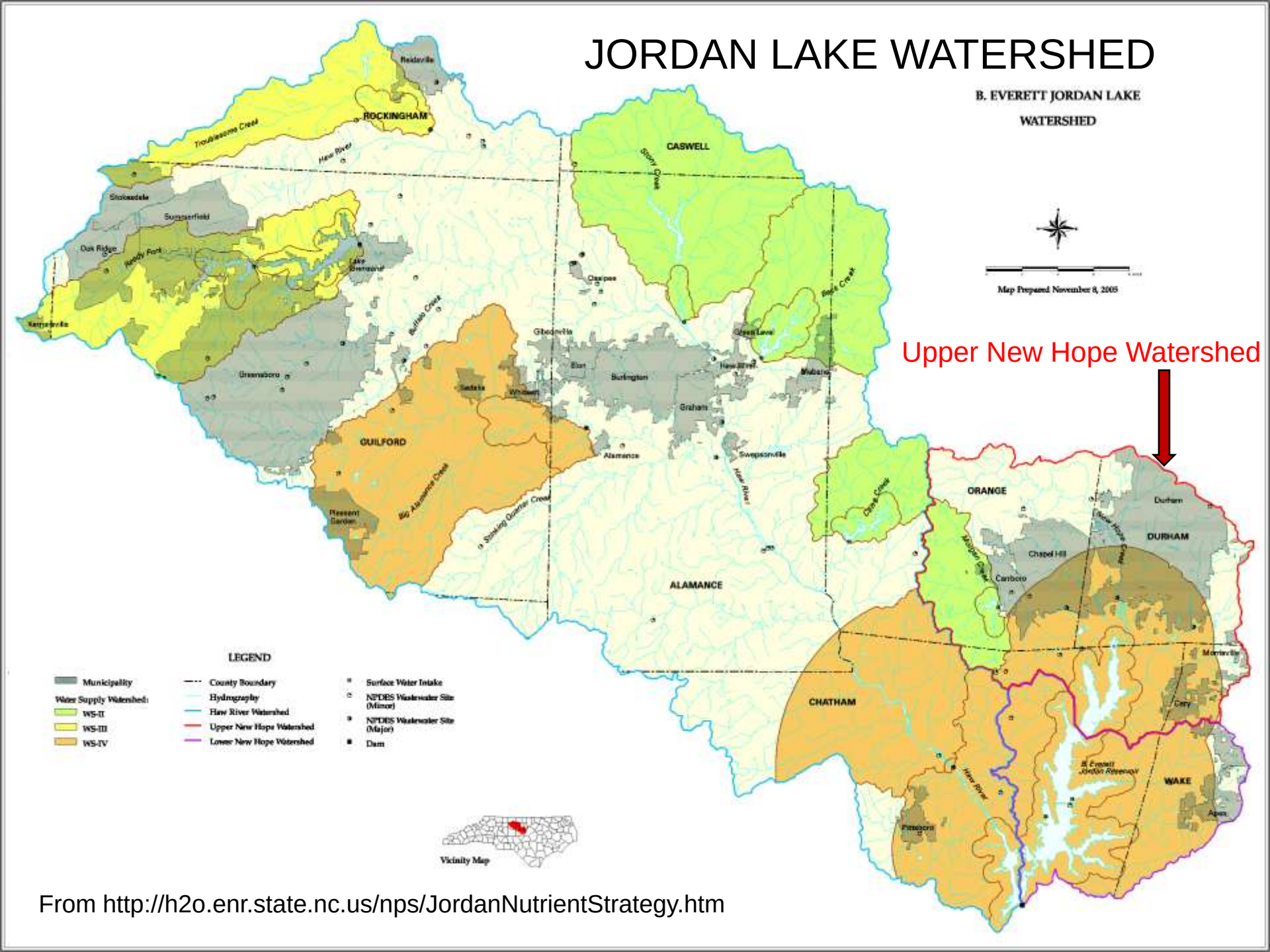
TMDLs and 303d listed streams in Durham

303d List of Impaired Stream in Durham

- Third Fork Creek
- Northeast Creek
- Ellerbe Creek
- Little Lick Creek
- New Hope Creek
- Lick Creek

JORDAN LAKE WATERSHED



From http://h2o.enr.state.nc.us/nps/JordanNutrientStrategy.htm

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Jordan Lake Rules Nutrient Management Strategy

New Development (as currently written)

- **Nitrogen and Phosphorus limits (Controls for new development and reductions for existing development)**
- **2.2 lbs/ac/year Nitrogen Export Limit**
- **0.82 lbs/ac/yr Phosphorus Export Limit**
- **Control and treat runoff of all surfaces for 1" of rainfall – release between 48 and 120 hours**
- **Provide 85% TSS removal**
- **No increase in 1-year 24-hour event**
- **Buffer Requirements**

NOTE: Baseline study for Jordan Lake was based on data from 2000 and 2001

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Future Falls Lake Rules

- A Nutrient Management Strategy is being developed for Falls Lake
- Permanent rules for implementation must be adopted by 7/1/09
- The City will likely be responsible for controls for nitrogen and phosphorus for new development and reductions in nitrogen and phosphorous for **existing** development.

UPDATE: Proposed nitrogen limits for Falls Lake have not been determined at this time. We are participating in the Stakeholder Group Meetings on a monthly basis.

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Stream Buffers

In the Neuse and Cape Fear River Basins, **50-foot wide** stream buffers are required along each side of **all** intermittent and perennial streams.

In Water Supply Overlay (WSO) areas, **50- to 150-foot wide** WSO buffers are required along each side of **all** intermittent and perennial streams. The “widths” are contingent on the type of stream, the intensity of development, and the WSO in which the stream is found.

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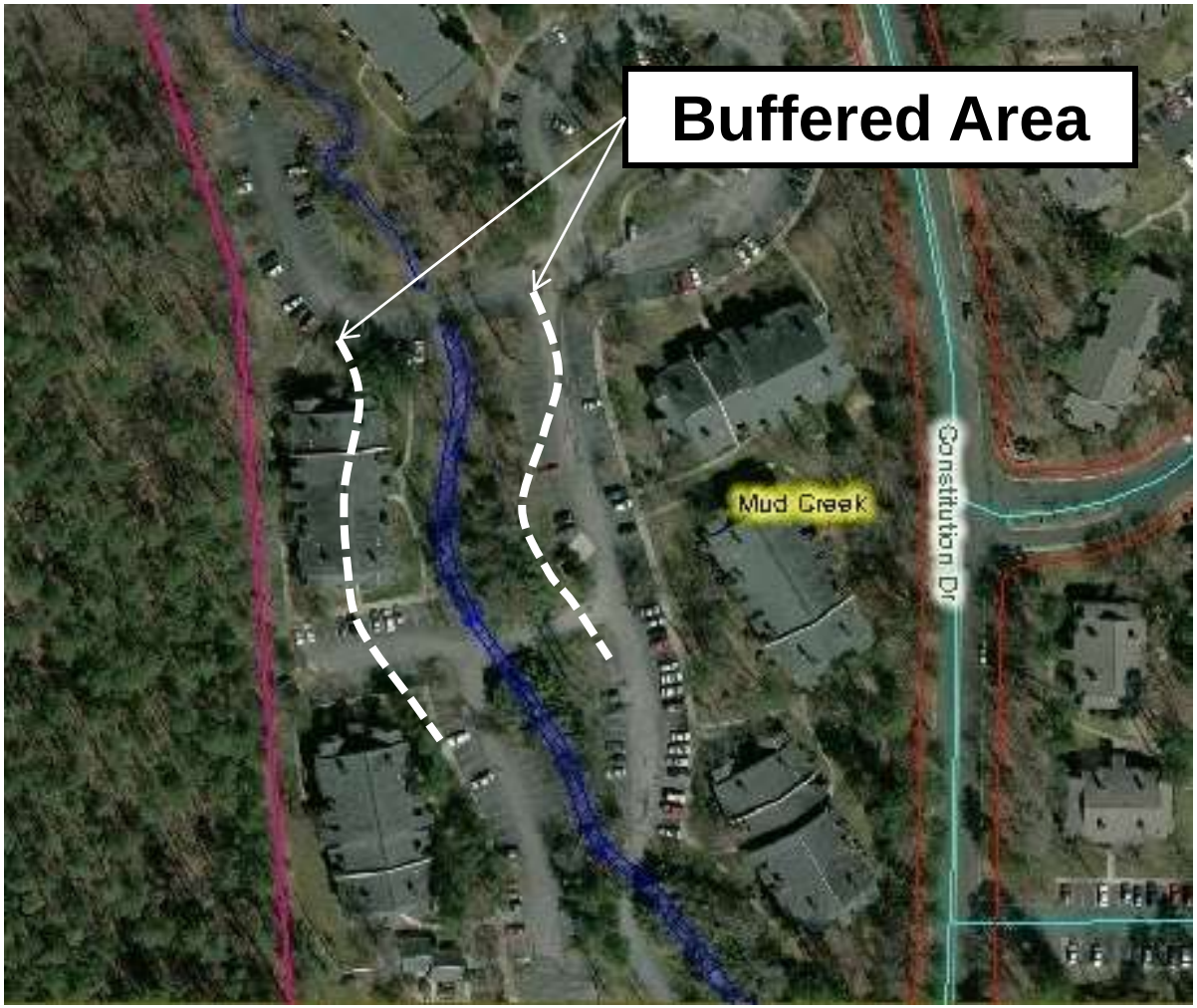
Stream Buffers



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Stream Buffers

Stream Identifications

As of June 2, 2008, Stormwater Services now reviews all Cape Fear Stream Identifications in the City of Durham submitted by the development community. Basically, a "Stream Identification" is a formal challenge of the existing stream mapping in the City.

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Protection of Stream Buffers

In new developments, most stormwater runoff that is concentrated in either a stormwater pipe or a channel is now “managed” in some fashion by a stormwater BMP prior to its discharge into a stream buffer. Such BMPs include…

“Dry” Ponds
(w/ Marsh/Landscaping” Enhancements)

Wet Ponds

Stormwater Wetlands

(Photo Taken in Late Fall)

Bioretention Areas

(Central Park BA)

Sand Filters

Level Spreaders

Rainwater Harvesting Systems (aka Cisterns)

Stormwater Facility Agreement and Covenants

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By ordinance requirement, the owner of a parcel of property on which a stormwater BMP is to be constructed is required to enter into an agreement with the City concerning the construction and perpetual inspection and maintenance of the facility.

The City has been requiring such agreements since the mid 1990s. Recently, the City, in collaboration with the Home Builders Association, modified the agreement that the City has been using for many years.

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Stormwater Facility Agreement and Covenants

The revised agreement outlines a more effective means of permitting the construction of each BMP as well as overseeing the construction, as-built certification, and long-term inspections and maintenance of each constructed BMP.

New Surety Process!!

- ~~Maintenance Performance Bonds, LOCs, or CDs prior to CD approval and utility permitting~~
- One-time payment (25% of BMP construction cost) into a City-managed Replacement Fund prior to building permit issuance.

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BMP As-Built Certifications

Since the inception of the City's Stormwater program, "as-builts" of constructed BMPs have been required.

In an effort to improve the as-built certification process (primarily review turn-around times) and to improve construction quality, Stormwater Services initiated an improved as-built certification program in July 2006.


BMP Certifying Engineer Certificate

Program Elements


BMP Certificate Of Acceptance

- Certification of NCPEs
- Standardized format for as-built submittals

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BMP As-Built Certifications

Program Benefits

- Once an NCPE has been certified to submit as-built certifications, review of as-built certifications submitted by such individuals are completed usually within one business day.
- The design professional is now compelled to be involved significantly in the construction process. This improves the quality of construction as well as the quality of future BMP design submittals.
- Complete and City approved as-built packages enable the long-term operation and maintenance of each BMP facility to start off on solid footing.

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BMP Maintenance and Inspections

The Stormwater Facility Agreement and Covenants (Agreement) requires the owner of a stormwater BMP to maintain the device in perpetuity and in accordance with current City maintenance guidelines.

Maintenance Guidelines

There are currently over 500 existing BMPs in the City of Durham. To help BMP owners to establish an effective maintenance program, Stormwater Services has published a BMP maintenance guide on the City's website.

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BMP Maintenance and Inspections

In addition, Stormwater staff meet with BMP owners on an almost daily basis regarding BMP maintenance and repair issues.

Inspections (Maintenance Certifications)

The Agreement, mentioned earlier, requires BMP owners to cause their BMPs to be inspected and certified annually by a qualified professional. This annual certification is an effective means of "encouraging" the proper maintenance of BMPs.

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BMP Maintenance and Inspections

Inspections (Maintenance Certifications)

In an effort to standardize and facilitate effective and orderly BMP inspections, Stormwater Services has created a maintenance inspection certification program similar to the as-built certification program highlighted earlier.


BMP MAINTENANCE CERTIFIER CERTIFICATE


ANNUAL BMP MAINTENANCE CERTIFICATION ACCEPTANCE CERTIFICATE

Program Elements

- Certification of NCPEs and NCRLAs
- Standardized format for certification submittals

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BMP Maintenance and Inspections

Program Benefits

- The vast majority of BMPs in the City of Durham will be thoroughly inspected and assessed by a qualified professional on an annual basis.
- The partnership that is being created between the City, BMP owners, and the certifying professionals is leading to more BMPs being maintained regularly.
- BMPs in need of significant maintenance are being refurbished and brought into conformance with City maintenance guidelines.

BMP Maintenance and Inspections

Public Works Department, Stormwater Services

Program Benefits

- Identification of operational problems associated with some design practices is leading to an increase in the quality of new BMP designs submitted to the City for review.


Before

After


Before


After

Before

After

After

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Proposed Stormwater Development Standards – Options

Apply Neuse type standards throughout the entire City for new development?

Setting limits on Nitrogen and Phosphorus? No buy down available in the Cape Fear Basin.

Is 1” of rainfall treatment enough? Volume reduction – Water Reuse

Existing Development requirements from TMDLs, Jordan Lake Rules, Falls Lake Rules?